LARVAE OF *BOTHROTES PLUMBEUS* AND *LOBOMETOPON FUSIFORME* (COLEOPTERA: TENTYRIIDAE: EPITRAGINI)

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Abstract

Larvae of the tribe Epitragini are characterized by a slender, elongate body, enlarged forelegs and prothoracic sternellum, transversely ridged labrum armed with stout, blunt setae, and the presence of a tuft of stout, blunt setae set in a membranous basal patch on the dorsolateral surface of each mandible. These features are similar to those of known tentyriid larvae, especially members of the tribe Tentyriini.

Characteristics of larval Tentyriidae (=Tentyriinae, Tenebrionidae of authors; see Doyen, 1972) are based on relatively few taxa, mostly from Eurasia and Africa. Among North American species, the only larvae associated with adults include 2 species of Asidini (*Philolitha* and *Stenomorpha*: Brown, 1973) and 2 species of Coniontini (*Coniontis* and *Coelus*: Marcuzzi and Rampazzo, 1960). Keleynikova (1971) described the larva of *Colposphena karelini*[1] (Ménétriés) from Turkmenia. Until now, this has been the only larva ascribed to the tribe Epitragini. The present paper describes larvae of 2 North American members of the Epitragini, *Bothrotes plumbeus* (LeConte) and *Lobometopon fusiforme* Casey.

The Epitragini occur in tropical and warm temperate regions throughout the world, except Australia. Most species are diurnally active fliers, commonly occurring on flowering herbs and shrubs. Pollen and flowers are probably the normal food of adults. Traditionally the Epitragini have been considered distinct from the Tentyriini (Horn 1870; Casey 1907; Freude 1967-68), which includes apterous, geophilous species. Koch (1950; 1955:19; 1960:33) compared apterous South African Epitragini with typical Tentyriini, concluding that the tribes were not distinct. His reasoning was based primarily on the genus *Derosphaerius*, where a gradual transition from fully winged to completely apterous species bridges the morphological gap between the 2 tribes. Apterous species of *Derosphaerius* also show strong development of supraorbital structures, dilation of the intercoxal process of the first visible abdominal sternite, and reduction of the precoxal grooves on the metasternum, characters frequently used to distinguish the Tentyriini from the Epitragini. Conversely, some Madagascan members of the Tentyriini have retained the precoxal grooves, though flightless (Koch, 1960). The evidence presented below indicates a high degree of similarity among larvae of the 2 tribes, supporting Koch's taxonomic conclusions.

Larvae described below were obtained by confining adult beetles in plastic utility boxes containing oviposition medium of mixed sand and oak leaf litter to a depth of about 5 cm. Further details of rearing were similar to those described by me earlier (1973). Larvae were preserved in Kahle's solution and later transferred to 70% ethyl alcohol. No attempt was made to determine the amount of time spent in the various instars, which probably varies considerably under either natural or laboratory conditions, depending on the availability of food and water. Descriptive terminology follows that of Spilman (1963).

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[1] Placed in the Tentyriini by Freude (1967).

Tribe Epitragini

Body elongate, slender, weakly moniliform (Fig. 1), slightly flattened ventrally; cuticle weakly sclerotized except for frontoclypeal suture, mandibles, hypopharynx and claws; cranium, pronotum and prosternellum with lateral portions densely set with long, fine setae.

Head prognathous (Fig. 2), dorsoventrally flattened, sometimes with 2 pigment spots ("ocelli") at base of each antenna; labrum and clypeus transverse, labrum with transverse, prominently raised ridge bearing row of stout blunt setae and with incomplete row of stout, blunt setae along anterior margin (Fig. 3, 9); mandibles with basal membranous patch on dorsolateral surface set with stout, blunt setae (Fig. 4, 10); right mandible bidentate, left weakly tridentate (Fig. 6, 10), molar surfaces simple, flattened; maxillae with fused mala and stipes, indistinctly 2 segmented cardo; mala with median row of stout spines (Fig. 7); submentum and gula fused; labium with mentum trapezoidal, ligula a short, median protuberance with 2 apical setae near midline (Fig. 6, 12); antennae with second segment about 1.5 times length of first; third segment peglike, with few apical setae (Fig. 3, 13).

Prothorax slightly longer than mesothorax and metathorax (*Bothrotes* and *Lobometopon*) or subequal (*Colposphena*); sternum broad, trapezoidal, lateral margins converging posteriorly; sternellum quadrispherical, enclosing coxal cavities laterally and posteriorly (Fig. 6); epipleura partially enclosing sternellum posteriorly, indistinctly separated from notum and pre-epipleura. Mesothorax and metathorax shorter than prothorax; sternum and sternellum indistinctly separated laterally, delimited by epipleural fold. Mesothoracic spiracles large, elliptical, set on preepipleura, partly concealed by sternum. Metathoracic spiracles small, set on preepipleura. Prothoracic legs enlarged, approximately 1.6 times length and girdth of mesothoracic and metathoracic legs; coxae globular, contiguous mesally, oriented anteroventrally on protruding sternellum (Fig. 2); trochanter conical, about one-half length of femur, sparsely spinose; femur robust, about two-thirds as broad as long, with pectin of stout, blunt setae ventrally, several elongate setae dorsally; tibia about twice as long as wide, with pectin of stout, blunt setae ventrally, slender, elongate setae dorsally; tarsungulis with short, transverse, weakly sclerotized basal segment bearing single stout, blunt seta; distal segment a strongly sclerotized claw (Fig. 5, 14). Mesothoracic and metathoracic legs about two-thirds size of prothoracic legs, more slender and without femoral and tibial setal pectins; tarsunguli simple, claws, without basal, desclerotized segment (Fig. 15).

First abdominal segment subquadrate, about 1.25 times wider than long; second through sixth segments weakly moniliform, widest in anterior quarter; third segment largest, thence gradually decreasing in size posteriorly; seventh and eighth segments subquadrate; each segment with 3 to 5 slender setae on anterolateral one-fifth, 1 to 3 setae in posterolateral one-fifth, small, circular spiracle located just anterad of anterior cluster of setae. Abdominal tergite 9 subconical in dorsal aspect, with numerous slender, posterolaterally directed setae along lateral margins, and 2 irregular arcs of stout bristles dorsolaterally and apically (Fig. 1); sternite 9 about half length of tergite, variably set with setae (Fig. 8, 16). Abdominal segment 10 modified as enlarged pygopodial lobes variably set with stout, sharp bristles and irregularly placed, longer, slender setae (Fig. 8, 16).

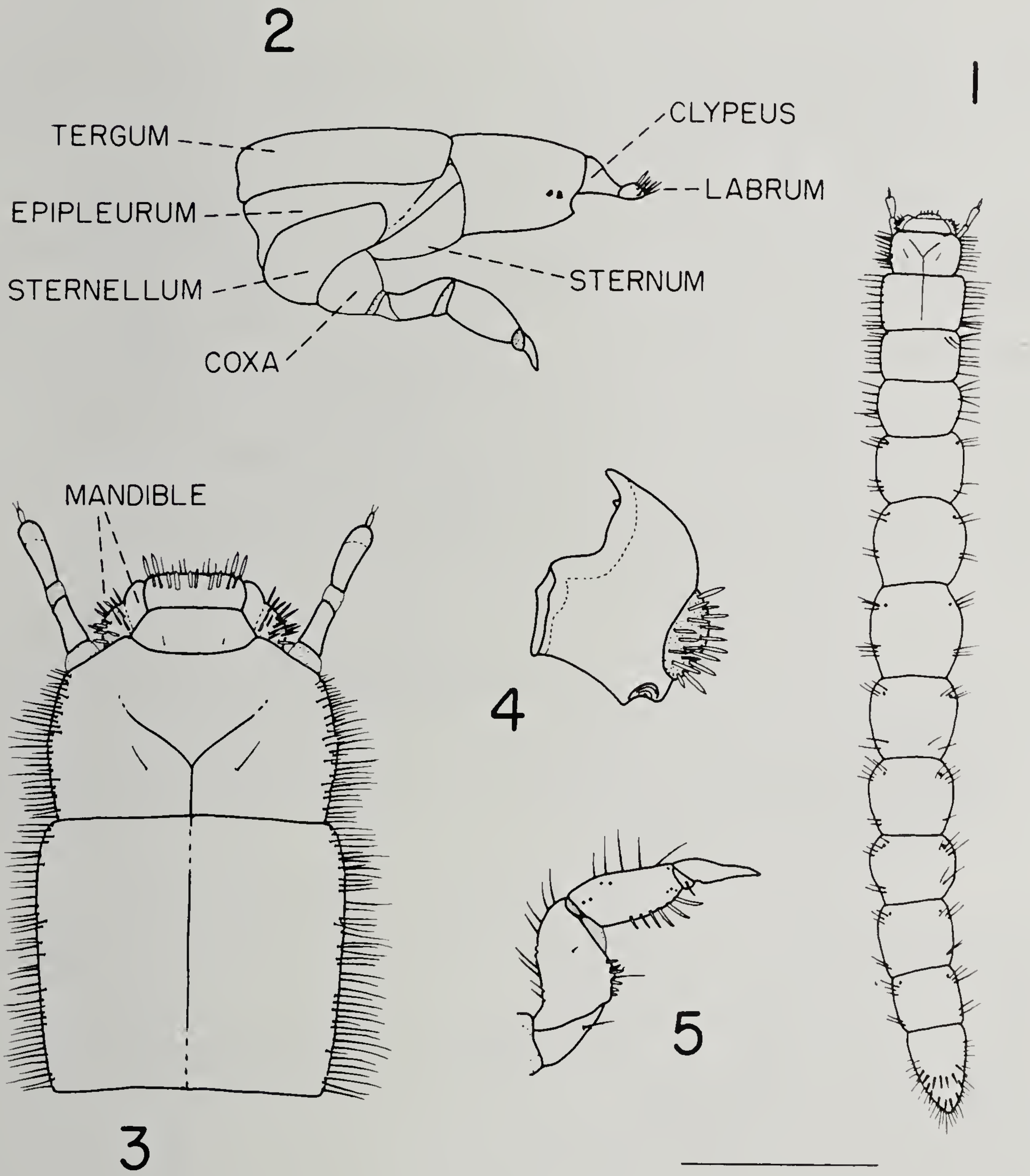

Fig. 1-5. *Lobometopon fusiforme* Casey: 1) intermediate instar larva, dorsal aspect (scale line = 2 mm); 2) diagrammatic relationships of head and pronotum, lateral aspect; mandibles, maxillae, labium omitted; 3) head and pronotum, dorsal aspect (scale line = 0.5 mm); 4) right mandible, dorsal aspect (scale line = 0.25 mm); 5) prothoracic leg (scale line = 0.5 mm).

Discussion. Brown (1973) has provided the most comprehensive descriptions of any larval tentyriids, and also summarized their most important morphological characteristics. These include the basal patches of setae on the mandibles, the greatly enlarged prothoracic sternellum, and the presence of only 2 ligular setae in first instars. Other features, such as the enlarged forelegs, development of urogomphi and enlargement of the pygopodia are inconsistently distributed among tentyriids and tenebrionids, and probably represent convergent adaptations for similar larval habitats.

Known larvae of the Epitragini share a general anatomical similarity with other members of the Tentyriidae. The most reliable diagnostic features appear to be 1) the dorsolateral patch of blunt, stout setae near the base of the

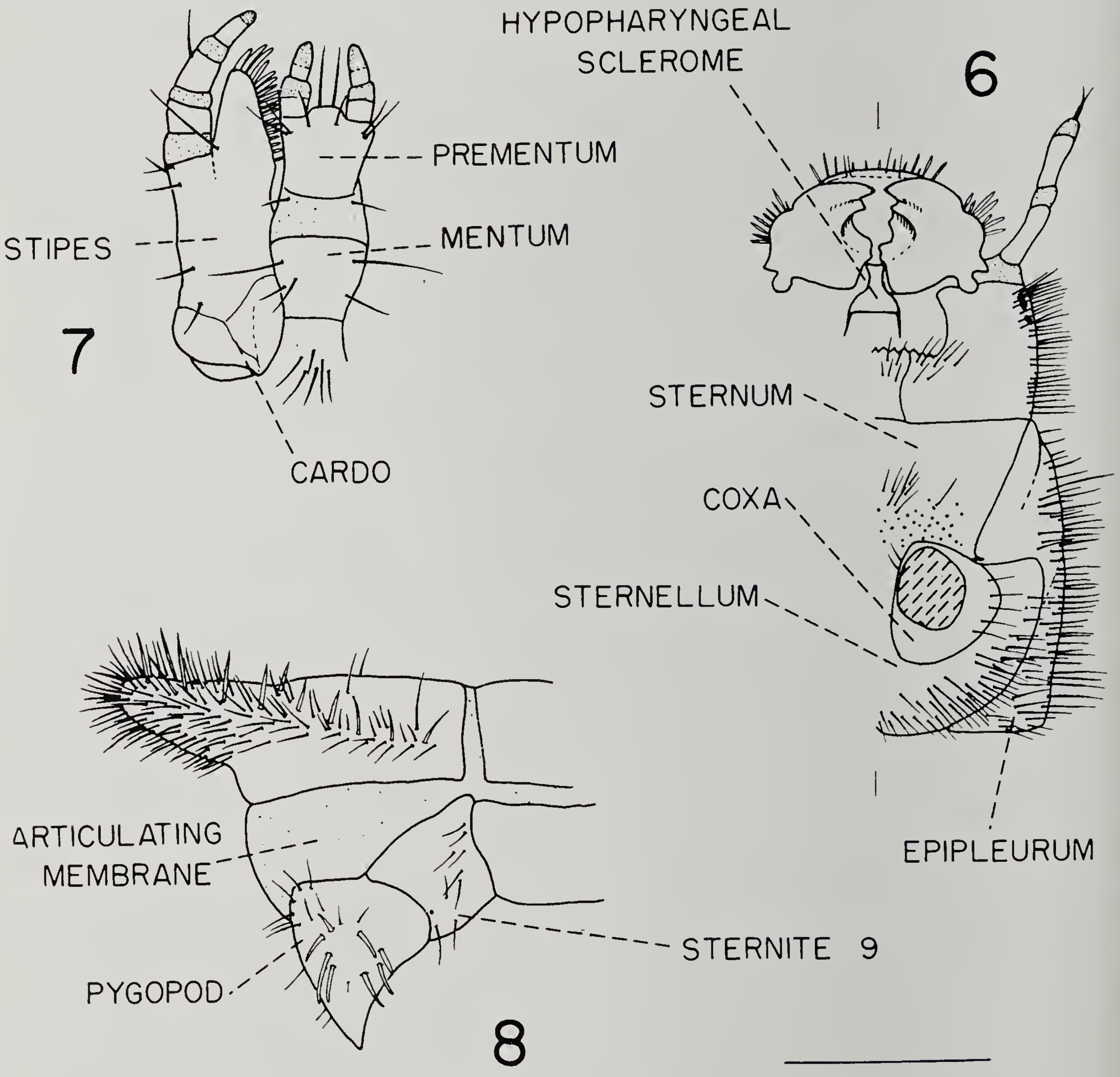

Fig. 6-8. *Lobometopon fusiforme*: 6) ventral aspect of head and prothorax; labium, maxillae, and leg removed (scale line = 0.5 mm); 7) right maxilla and labium, ventral aspect (scale line = 0.25 mm); 8) abdominal segments 9 and 10, lateral aspect (scale line = 0.5 mm).

mandibles (setae ventrolateral, slender and elongate in the Asidini; slender, elongate in the Adesmiini; both stout, blunt and slender, elongate in the Coniontini); 2) the glabrous clypeus and cranium (set with granules in the Asidini; set with short, blunt setae in the Coniontini and Adesmiini). *Bothrotes* and *Lobometopon* are extremely similar to *Colposphena,* except in spination of the epipharynx and details of body setation. It may be expected that other larvae of the Epitragini will conform in most characteristics. Larvae of Epitragini and Tentyriini (as characterized by Keleynikova, 1971) are extremely similar in all major features, supporting Koch's (1955, 1960) placement as subtribes of the Tentyriini.

Lobometopon fusiforme Casey
(Fig. 1-8)

Intermediate instar larva (Fig. 1): Length 8.2-10.6 mm; head capsule width 0.58-0.88 mm. Eleven individuals examined (probably fourth and fifth instars); reared from adults from New Mexico, Hidalgo County, 29 mi. E. Douglas, Cochise County, Arizona, 30-VIII-1971.

Cranium nearly glabrous dorsally, with single slender seta posterolaterad of anterior branches of epicranial suture on each side (Fig. 3); glabrous ventrolaterally, with transverse patch of setae across gula and subgenae just posterad of oral cavity (Fig. 5). Labrum with transverse ridge set with 8-10 stout, blunt setae, and with 2 stout blunt setae on each side of anterior margin, 8-10 slender setae on anteromedial margin (Fig. 2, 3); mandibles with 16-20 stout, blunt setae set in membranous dorsolateral patch near base (Fig. 4). Maxilla with mala bordered medially with single row of stout, weakly curved setae. Ligula with a pair of apical setae, a second pair of subapical setae, and a pair inserted laterally near base of each labial palp (Fig. 7). Prothoracic legs with pectin of 5 or 6 short, stout spines on femur, 6 longer spines on tibia (Fig. 5).

The dense lateral setation of the cranium and thoracic segments is slightly variable in its dorsal and ventral extent. The setation of the abdominal segments and legs varies among individuals, among segments, and sometimes between the right and left sides of a single individual, probably due in part to the loss of setae during burrowing.

Bothrotes plumbeus (LeConte)
(Fig. 9-16)

Intermediate instar larva: Length 3.7-5.5 mm; head capsule width 0.32-0.53 mm. Ten individuals examined (probably second and third instars); reared from adults from New Mexico, Hidalgo County, 2 mi. W. Rodeo, 31-VII-1971.

Cranium glabrous dorsally, glabrous ventrolaterally with irregular patch of slender setae on gula and extreme anteromedial corners of subgenae (Fig. 13). Labrum with transverse ridge set with 8 stout, blunt setae, with a single stout, blunt seta on each side of anterior margin (Fig. 9), and 8-10 slender setae on anteromedial margin; mandibles with 7-10 stout, blunt setae, sometimes with 1 or 2 short, slender setae set in membranous dorsolateral patch (Fig. 10). Maxilla with mala bordered medially by single row of stout, marginal setae, with parallel row of shorter setae slightly laterad of mesal margin. Ligula with

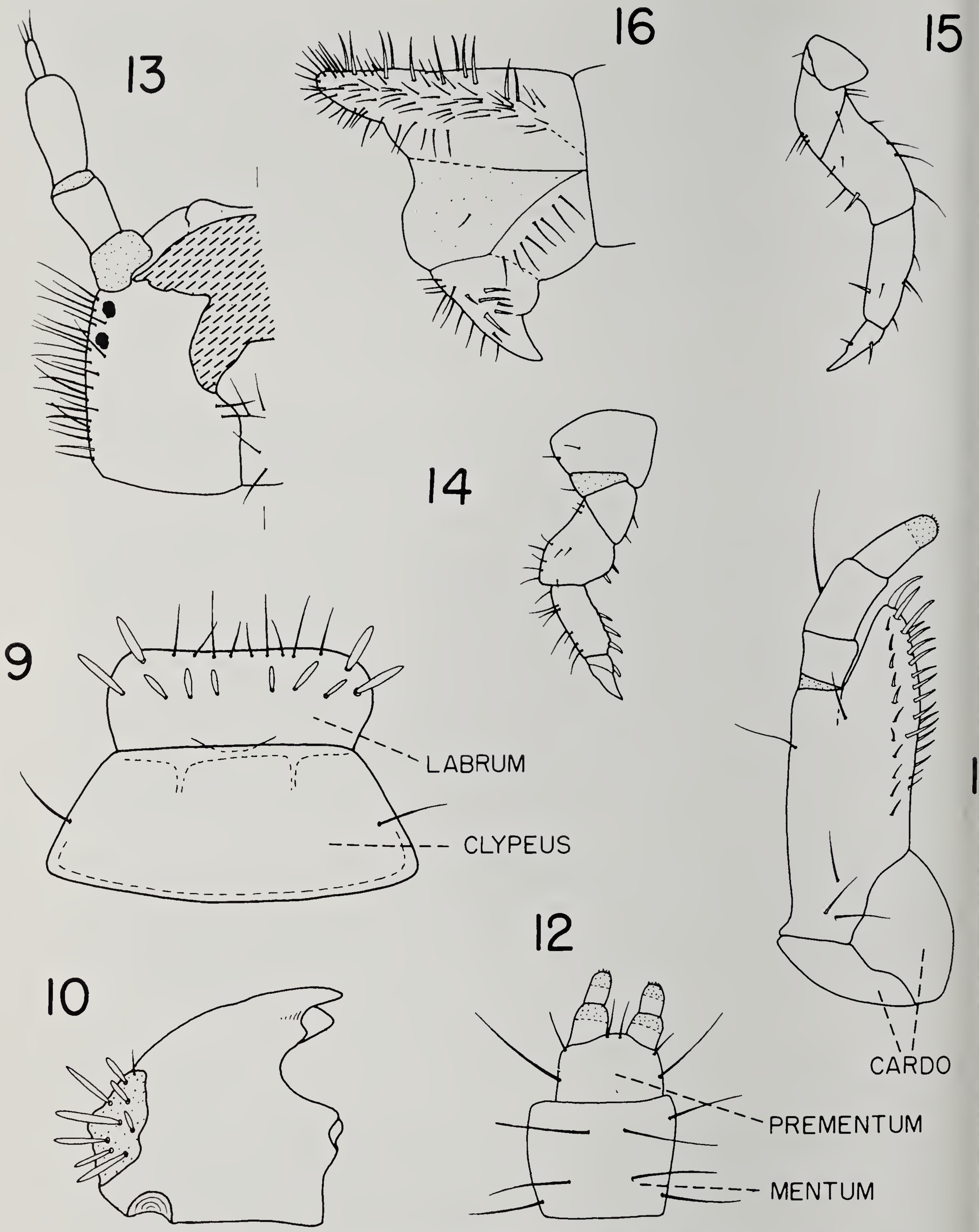

Fig. 9-16. *Bothrotes plumbeus* (LeConte): 9) labrum and clypeus, dorsal aspect (scale line = 0.1 mm); 10) left mandible, dorsal aspect (scale line = 0.1 mm); 11) right maxilla, ventral aspect (scale line = 0.1 mm); 12) labium, ventral aspect (scale line = 0.01 mm). Note that the prementum is retracted beneath the mentum; 13) cranium, ventral aspect (scale line = 0.33 mm); 14) prothoracic leg (scale line = 0.33 mm); 15) mesothoracic leg (scale line = 0.16 mm); 16) abdominal segments 9 and 10, lateral aspect (scale line = 0.33 mm).

a pair of apical setae, single seta on each lateral corner near insertions of palps, and one marginal seta on each side near midpoint (Fig. 11, 12). Prothoracic legs with 2-3 short, blunt spines on ventral margin of femur, 3 longer spines on ventral margin of tibia (Fig. 14, 15).

Variation in setation of the cranium, thorax, and abdomen is similar to that in *Lobometopon*. Differences in setation of the labrum, mandibles, ligula, and legs between *Bothrotes* and *Lobometopon* may be due in part to differences in age of the larvae, since Brown (1973) has shown that setae are commonly added during molts. There is also considerable variation in setation of the ninth abdominal tergite, the ninth sternite, and the pygopodia, in both species. The most consistent differentiating character is probably the setational pattern of the maxillae (a single mesal row of setae in *Lobometopon*; 2 parallel rows in *Bothrotes*).

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